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Contribution of BDNF-Mediated Inhibition in Patterning Avian Skin Innervation

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Abstract

Multiple factors are involved in the development and regulation of sensory innervation in skin. The findings we report here suggest that brain-derived neurotrophic factor (BDNF)-mediated inhibition may play an important role in determining the pattern of sensory innervation in avian skin. In birds, cutaneous innervation is restricted to dermis, where axons form a ring of innervation around the base of each feather. Here we show that both BDNF message and protein are more abundant in avian epidermis than dermis when innervation is being established; the BDNF in dermis is localized to feather buds. *In vitro*, BDNF caused growth cones of NGF-dependent dorsal root ganglion neurons to collapse. Similarly, outgrowth of neurites toward BDNF-secreting fibroblasts was inhibited. The inhibitory effects of BDNF appear to be mediated by the low-affinity p75 neurotrophin receptor, rather than a trk receptor. Thus, the distribution of BDNF in embryonic avian skin and the inhibitory effects of BDNF on cutaneous neurites *in vitro* suggest that BDNF may be important in restricting axons from entering the epidermis and the core of feather buds during development *in vivo*.

Keywords

skin; development; chick; BDNF; sensory innervation; cutaneous; inhibition

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